

Amendments to the Claims:

This listing of claims replaces all prior versions of the claims.

Listing of Claims:

Claim 1 (currently amended): A method for controlling an interpolation direction of a
5 pixel needing to be interpolated between a first row and a second row within an
image, the image having a plurality of pixels arranged in a matrix format, the
method comprising:

- 10 (a) calculating a plurality of first horizontal pixel value differences between pixels
positioned in the first row and calculating a plurality of second horizontal
pixel value differences between pixels positioned in the second row, wherein
the first ~~and second~~ horizontal pixel value differences ~~respectively~~
correspond to ~~opposite quadrants~~ a first quadrant of the image with the pixel
needing to be interpolated being an origin, the second horizontal pixel value
differences correspond to a second quadrant of the image with the pixel
15 needing to be interpolated being the origin, and the first quadrant is opposite
to the second quadrant; and
- (b) comparing the plurality of first horizontal pixel value differences with a first
threshold and the plurality of second horizontal pixel value differences with a
second threshold to control whether the interpolation direction is orthogonal
20 to the first row and the second row.

Claim 2 (original): The method of claim 1, wherein step (b) controls whether the
interpolation direction is orthogonal to the first row and the second row according to
at least one of the following steps (b-1), (b-2), and (b-3):

- 25 (b-1) if any of the plurality of first horizontal pixel value differences is greater than
the first threshold and any of the plurality of second horizontal pixel value
differences is greater than the second threshold, controlling the interpolation

direction not to be orthogonal to the first and the second rows, otherwise, controlling the interpolation direction to be orthogonal to the first and the second rows;

5 (b-2) if none of the plurality of first horizontal pixel value differences is greater than the first threshold or none of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction to be orthogonal to the first and the second rows, otherwise, controlling the interpolation direction not to be orthogonal to the first and the second rows; and

10 (b-3) if any of the plurality of first horizontal pixel value differences is greater than the first threshold and any of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction not to be orthogonal to the first and the second rows, and if none of the plurality of first horizontal pixel value differences is greater than the first
15 threshold or none of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction to be orthogonal to the first and the second rows.

Claim 3 (original): The method of claim 1, further comprising:

20 (c) generating the interpolation direction corresponding to the pixel needing to be interpolated according to a directional interpolation process.

Claim 4 (original): The method of claim 1, wherein the first threshold is equal to the second threshold.

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Claim 5 (original): The method of claim 1, wherein the first row is adjacent to the second row.

Claim 6 (currently amended): The method of claim 5, wherein:

5 step (a) further comprises calculating a plurality of third horizontal pixel value differences between pixels positioned in a third row and calculating a plurality of fourth horizontal pixel value differences between pixels positioned in a fourth row, wherein the third ~~and fourth~~ horizontal pixel value differences ~~respectively~~ correspond to ~~opposite quadrants~~ the first quadrant of the image with the pixel needing to be interpolated being the origin, and the fourth horizontal pixel value differences correspond to the second quadrant of the image with the pixel needing to be interpolated being the
10 origin; and

step (b) further comprises comparing the plurality of third horizontal pixel value differences with a third threshold and the plurality of fourth horizontal pixel value differences with a fourth threshold to control whether the interpolation direction is orthogonal to the first, second, third, and fourth rows.

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Claim 7 (original): The method of claim 6, wherein the first and second rows are positioned between the third and fourth rows.

20 Claim 8 (original): The method of claim 7, wherein the first, second, third, and fourth rows correspond to four successive rows.

Claim 9 (currently amended): The method of claim 1, wherein:

25 step (a) further comprises calculating a plurality of third horizontal pixel value differences between pixels positioned in a third row and calculating a plurality of fourth horizontal pixel value differences between pixels positioned in a fourth row, wherein the third ~~and fourth~~ horizontal pixel value differences ~~respectively~~ correspond to ~~opposite quadrants~~ the first quadrant of the image with the pixel needing to be interpolated being the origin, and

the fourth horizontal pixel value differences correspond to the second quadrant of the image with the pixel needing to be interpolated being the origin; and

5 step (b) further comprises comparing the plurality of third horizontal pixel value differences with a third threshold and the plurality of fourth horizontal pixel value differences with a fourth threshold to control whether the interpolation direction is orthogonal to the first, second, third, and fourth rows.

10 Claim 10 (original): The method of claim 1, wherein step (a) calculates the first horizontal pixel value differences through a repeated use of pixel with other pixels positioned in the first row.

15 Claim 11 (original): The method of claim 1, wherein step (a) calculates the second horizontal pixel value differences through a repeated use of pixel with other pixels positioned at the second row.

 Claim 12 (original): The method of claim 1, wherein step (a) calculates each of the second horizontal pixel value differences from adjacent pixels.

20 Claim 13 (original): The method of claim 1, wherein step (a) calculates each of the first horizontal pixel value differences from adjacent pixels, and calculates each of the second horizontal pixel value differences from adjacent pixels.

25 Claim 14 (currently amended): A device for controlling an interpolation direction of a pixel needing to be interpolated between a first row and a second row within an image, the image having a plurality of pixels arranged in a matrix format, the device comprising:
 an arithmetic unit for calculating a plurality of first horizontal pixel value

5 differences between pixels positioned in the first row and calculating a plurality of second horizontal pixel value differences between pixels positioned in the second row, wherein the first ~~and second~~ horizontal pixel value differences ~~respectively~~ correspond to ~~opposite quadrants~~ a first quadrant of the image with the pixel needing to be interpolated being an origin, the second horizontal pixel value differences correspond to a second quadrant of the image with the pixel needing to be interpolated being the origin, and the first quadrant is opposite to the second quadrant; and

10 a processing unit electrically connected to the arithmetic unit for controlling the interpolation direction, the processing unit comparing the plurality of first horizontal pixel value differences with a first threshold and the plurality of second horizontal pixel value differences with a second threshold to control whether the interpolation direction is orthogonal to the first row and the second row.

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Claim 15 (original): The device of claim 14, wherein the processing unit controls whether the interpolation direction is orthogonal to the first row and the second row according to at least one of the following steps (a-1), (a-2), and (a-3):

20 (a-1) if any of the plurality of first horizontal pixel value differences is greater than the first threshold and any of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction not to be orthogonal to the first and the second rows, otherwise, controlling the interpolation direction to be orthogonal to the first and the second rows;

25 (a-2) if none of the plurality of first horizontal pixel value differences is greater than the first threshold or none of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction to be orthogonal to the first and the second rows,

otherwise, controlling the interpolation direction not to be orthogonal to the first and the second rows; and

5 (a-3) if any of the plurality of first horizontal pixel value differences is greater than the first threshold and any of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction not to be orthogonal to the first and the second rows, and if none of the plurality of first horizontal pixel value differences is greater than the first threshold or none of the plurality of second horizontal pixel value differences is greater than the second threshold, controlling the interpolation direction to
10 be orthogonal to the first and the second rows.

Claim 16 (original): The device of claim 14, wherein the device is electrically coupled to a directional interpolation unit, and the processing unit generates the interpolation direction corresponding to the pixel needing to be interpolated according to a
15 temporary direction generated by the directional interpolation unit.

Claim 17 (original): The device of claim 16, wherein the arithmetic unit and/or the processing unit are installed in the directional interpolation unit.

20 Claim 18 (original): The device of claim 14, wherein the arithmetic unit and the processing unit are integrated into one module.

Claim 19 (currently amended): The device of claim 14, wherein:
the arithmetic unit is capable of calculating a plurality of third horizontal pixel
25 value differences between pixels positioned in a third row and calculating a plurality of fourth horizontal pixel value differences between pixels positioned in a fourth row, wherein the third ~~and fourth~~ horizontal pixel value differences ~~respectively~~ correspond to ~~opposite quadrants~~ the first quadrant

of the image with the pixel needing to be interpolated being the origin, and
the fourth horizontal pixel value differences correspond to the second
quadrant of the image with the pixel needing to be interpolated being the
origin; and

5 the processing unit is capable of comparing the plurality of third horizontal pixel
value differences with a third threshold and the plurality of fourth horizontal
pixel value differences with a fourth threshold to control whether the
interpolation direction is orthogonal to the first, second, third, and fourth
rows.

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Claim 20 (original): A method for determining an interpolation direction of a designated
pixel located between a first row of horizontal pixels and a second row of
horizontal pixels within an image, the method comprising:

15 (a) obtaining first values representing differences between pairs of at least some of
the first row of horizontal pixels, and obtaining second values representing
differences between pairs of at least some of the second row of horizontal
pixels; and

20 (b) comparing the first values with a first threshold and the second values with a
second threshold to determine whether the interpolation direction is
orthogonal to the first row and the second row.

Claim 21 (original): The method of claim 20, wherein the first values are obtained by
calculating luminance or chrominance values of the first and second rows of
horizontal pixels.

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Claim 22 (original): The method of claim 20, wherein step (b) determine whether the
interpolation direction is orthogonal to the first row and the second row according to
at least one of the following steps (b-1), (b-2), and (b-3):

- 5 (b-1) if any of the first values is greater than the first threshold and any of the second values is greater than the second threshold, controlling the interpolation direction not to be orthogonal to the first and the second rows, otherwise, controlling the interpolation direction to be orthogonal to the first and the second rows;
- 10 (b-2) if none of the first values is greater than the first threshold or none of the second values is greater than the second threshold, controlling the interpolation direction to be orthogonal to the first and the second rows, otherwise, controlling the interpolation direction not to be orthogonal to the first and the second rows; and
- 15 (b-3) if any of the first values is greater than the first threshold and any of the second values is greater than the second threshold, controlling the interpolation direction not to be orthogonal to the first and the second rows, and if none of the first values is greater than the first threshold or none of the second values is greater than the second threshold, controlling the interpolation direction to be orthogonal to the first and the second rows.